# Attachment C

# Safety Systems and Institutional Controls Working Group Results and Homework

**Facilitator: Lori Braase, INEEL**

# SS&IC

# 1.0 Develop a Finite Number of Generic, Standardized, Risk-based, Efficient Safety Systems

**Capability:** **1.1 Develop a methodology for Safety Systems selection.**

**Target:** **Deploy draft risk-based technology store by 2004 and final by 2006 to reduce capitol and O&M costs by 40%.**

**April 8, 2002**

**Prepared by: Safety Systems & Industrial Controls Working Group:**

- **Jim Mohatt, Chairman**
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Long-Term Stewardship
Science and Technology Roadmap

# TECHNICAL APPROACHES (FORM A)

**Program Activity:** 1.0 Develop a finite number of generic, standardized, risk-based, efficient safety systems.

**Capability:** 1.1 Develop a methodology for Safety Systems selection.

**Associated Target(s):** Deploy draft risk-based technology store by 2004 and final by 2006 to reduce capitol and O&M costs by 40%.

**Technique/technology # 1**

(Active Systems)

**Title:** Deploy sensors/monitors/passive system hardware to the sites. Sensors that can detect contaminants, operate remotely, and require 40% less maintenance than presently employed.

**Current maturity level:** Yellow/orange.

**Range of applicability:** The technology should be applicable to all closure sites, for contaminants in soils (mechanically transmitted) and air.

When the completion of all other approaches are complete, the units can be "commissioned" and they can then be tailored to be employed at all sites where needed and necessary.

All that will be needed for this task is a deployment and procurement plan with the appropriate quality assurance requirements and certified vendor data.

Task duration: 1 month @ $50,000.00

**Needed RD&D:** Yellow/orange. Industry vendors are doing their own R&D but likely are not working on sensors for all the stewardship target contaminants (yet to be determined), especially sensors that are remote and require significantly less maintenance and last for long periods. These sensors do not need to necessarily read absolutes, but rather detect and signal when thresholds of target contaminants are exceeded.

**Technique/technology # 2**

(Passive Systems)

**Title:** Alarms and consistent & effective barriers. Need to remotely detect breaks in integrity of site boundaries and sources of residue.

**Current maturity level:** Green/yellow.

**Range of applicability:** The technology should be available and applicable to all closure sites, for contaminants in groundwater, soils, and air.

**Needed RD&D:** Green/yellow.

**Technique/technology # 3**

(Passive Systems)

**Title:** Provide intrusion detectors and site barriers on site boundaries and source terms. Intrusion detection to detect movement in restricted areas.

**Current maturity level:** Yellow. Task is Green:

Defense in depth will be provided from the boundary to the source of residue material. The technology, for all passive system concerns, that the workgroup has developed, is available and being refined to become more rugged and lasting. All requirements, such as gates, fencing, intrusion detection, topographical change detectors, etc. are available and simply have to be adapted to the site environment.

Necessary action: Provide site specific Deployment Plan in passive system defense.

Preliminary action: Insure that signals can be properly interrogated and will provide prompt response.

Cost 100,000.00 dollars and 4 months time

**Range of applicability:** The technology should be applicable to all closure sites, for contaminants in groundwater, soils, and air.

**Needed RD&D:** Yellow. There are remote monitoring systems on the market (mostly video-type) but these detection devices need to detect movement remotely and record the events in a database.

# Technology Pathway Summary (Form B)

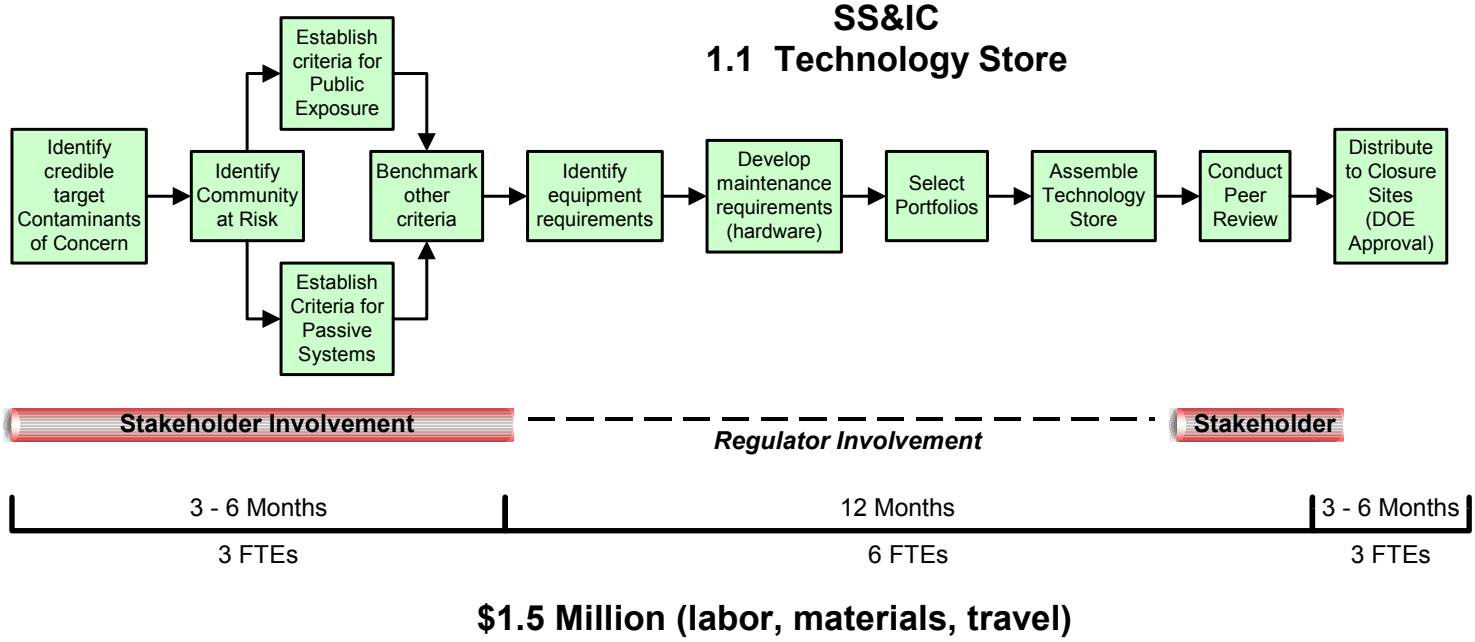
**Program Activity:** 1.0 Develop a finite number of generic, standardized, risk-based, efficient safety systems.

**Capability:** 1.1 Develop a methodology for Safety Systems selection.

**Associated Target(s):** Deploy draft risk-based technology store by 2004 and final by 2006 to reduce capitol and O&M costs by 40%.

**Sketch of task relationships**

The following sketch shows the relationships among the various tasks for this target.




**$1.5 Million (labor, materials, travel)**

**Task # 1**
**RD&D Phase:** Green **Est. Duration** (months): 1 **Est. Cost** ($K): $86

**Description:** Identify credible target contaminants of concern.

What contaminants can be used as indicators of contaminant migration to detect when that migration is beyond limits established in the site stewardship conceptual models? We cannot

develop sensors for every contaminant occurring at the near-term closure sites. We need a short list of those contaminants that if detected will indicate that a problem is emerging at a stewardship site.

**Prerequisites:** A complete understanding of the contaminants (e.g., mobility, pressure) at each near-term closure site is needed for each pathway (air and water) so that the appropriate number and best target contaminants can be selected.

**Expected products/results:** Once the target contaminants are selected that adequately represent all of the contaminants of concern at the near-term closure sites, focused R&D on remote and efficient sensors can begin. This is a critical path item for developing generic safety systems as it is the target contaminants that render the safety systems generic.

**Task # 2**
**RD&D Phase:** Yellow/ Orange **Est. duration** (months): 36 **Est. Cost** ($K) $1,000

**Description:** Identify Community at Risk:

Conceptually, the community at Risk (CAR) is that area adjacent to resident population that lives, recreates, or visits the areas next to the **non-static**, site boundaries. The community at risk would be the population that could credibly be affected from the residual material moving into an area either through airborne means or by mechanically being transported by natural flora or fauna. (Adjacent residents or routine visitors/recreators adjacent to the site boundry.)

Obviously, the extent and scope of the CAR can only be determined when several tasks have first been completed. Those tasks would be:

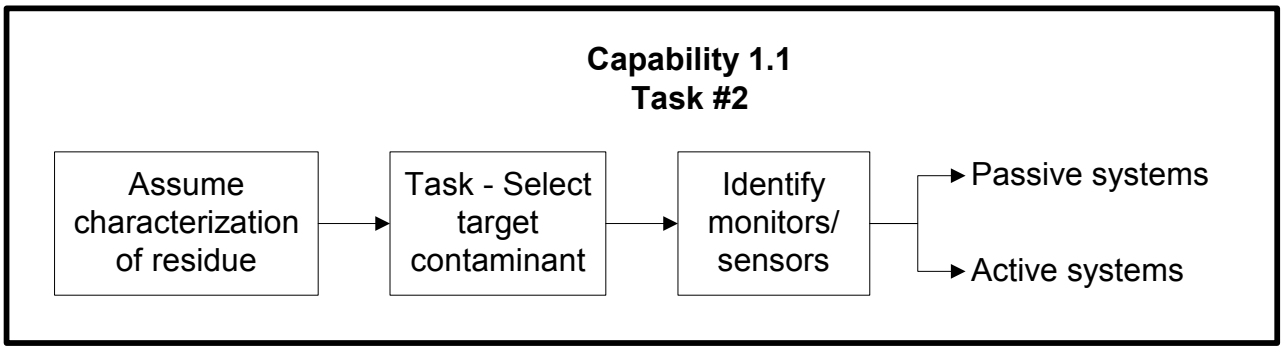
a. Characterization of the source term of contaminates in the residual, and the determination of targets.
b. Reliability of detection of targets (see other tasks),
c. Meteorological conditions
d. Demographic conditions, i.e., type of use in adjacent areas.

**Assumption:** The boundaries of site will not remain static over time given existing land-use controls. For example, zoning ordinances may only last as long as two or three county administration changes.

**Prerequisites**: A peer-reviewed methodology which can identify the credible community at risk at all sites needs to be provided. Recently EPA and OSHA have passed regulations regarding process safety of chemical plants using large quantities of highly hazardous chemicals. The regulations in force provide for identification of source terms by quantity and characteristics, down wind vapor hazards etc. in order to protect the surrounding public. Likewise, many large municipal governments are now requiring contractors who are conducting “brownfield” work in an urban environment to provide a sampling strategy for the surrounding community (call it CAR) and for the contractor to determine the zone of influence on the surrounding community.

As a benchmark, the process safety regulations took years and many hundreds of thousands of dollars to create and finally pass as Code of Federal Regulations.

Cost: 1 million dollars for the methodology, which can be employed/adapted at each site. Duration is 36 months.




**Expected Products/Results:**

**Task # 3**
**RD&D Phase:** Red **Est. duration** (months): 48 **Est. Cost** ($K): $2,000

**Description:** Establish criteria for health exposure for occupational and non-occupational personnel categories.

System is GREEN and RED

A lasting and scientifically defensible criteria must be developed to provide action levels/warning levels of target contaminants in order for proper protective response by persons within the community at risk (CAR).

Provide risk exposure criteria thresholds and action limits for inhabitants and site entrants.

There will, for purposes of this task, be two separate groups of individuals. They are the occupational (Passive Systems) and the non-occupational (Active Systems). The occupational group of individuals are those who have an authorized permission to enter the site barriers for reasons of maintenance, inspection, or for cultural visitations, etc.

The occupational population will be governed, monitored and tracked for exposure based upon the regional, State or public entity having jurisdiction other than DOE. The exposure levels for chemicals and radiological exposure are governed by the various state jurisdictions such as the ecology or health departments. The various state standards are continually updated to reflect current epidemiological and toxicological information and are likely to remain in effect through time. As a result, there is no need to augment, change or add any additional criteria for exposure

to chemical, biological or radiological materials for the occupational segment of the population. This system is GREEN.

The non-occupational or CAR population is the (to be determined) souls who reside or routinely visit the areas adjacent to the **Non-Static** boundaries of the site. There are no regulations for 24 hour based chemical exposure over a prolonged period of time to small quantities of contaminants from the site residue. However, some target agents can be derived from the mix of potential contaminants that can be credibly liberated and mechanically transported to the CAR and thus detected. Very low concentrations of military weapon chemicals are being remotely detected in the parts-per-billion range. Some professional organizations have published guides for some very limited contaminants. Although these guides have gone through some level of peer review, the likelihood of their continuing existence is fragile at best. Also, the universe of chemicals is rather limited. As a result those guides may not be updated as a result of an association's change of focus or eventual demise. Several lasting options that could provide a methodology which could be used to establish non-occupational threshold limits could include ANSI or the State Governors association.

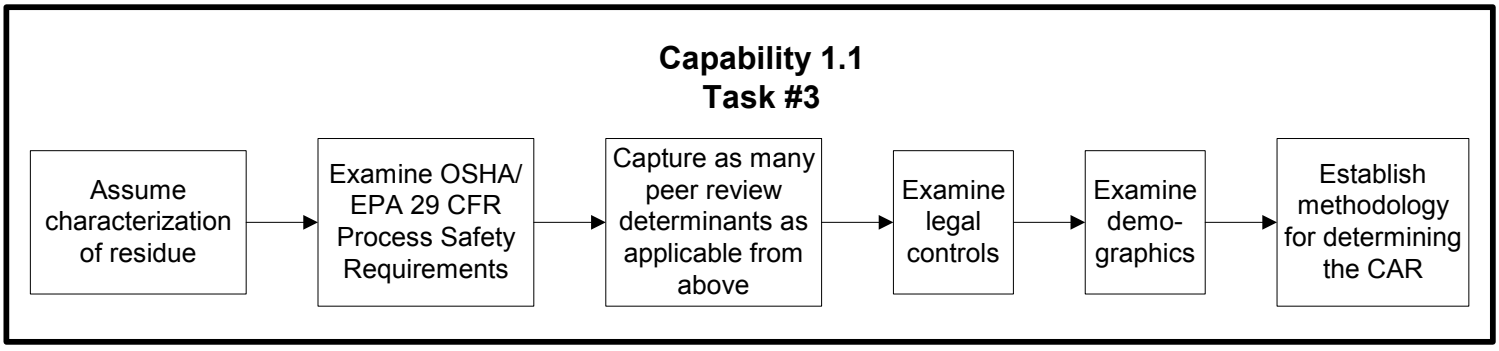
OSHA would not be involved in the active systems and the local health departments would need some criteria that could withstand technical scrutiny in order to adequately respond to community concerns.

This is not a simple task: I have received comments regarding the field expedient of a fractional reduction of all OSHA exposure levels and applying them to residential environments as bordering on malpractice. Assuming local or state agencies are responsible, some meaningful criteria must be provided which can be incorporated into the LTS program. Clear recognition must be made that the non-occupational population should be protected.

The above Task or sub Task is RED/Orange

It will take a minimum of four years to get this through the peer review cycle and gain stakeholder acceptance cycle and will take 2 Million dollars.

**Prerequisites:** The preliminary tasks to this effort will be defining the target materials to be sampled (TASK Target) and then "marry" with instruments/sensors. 1. Determine the credible contaminants of concern left in residue at the site. 2. Determine contaminant targets.

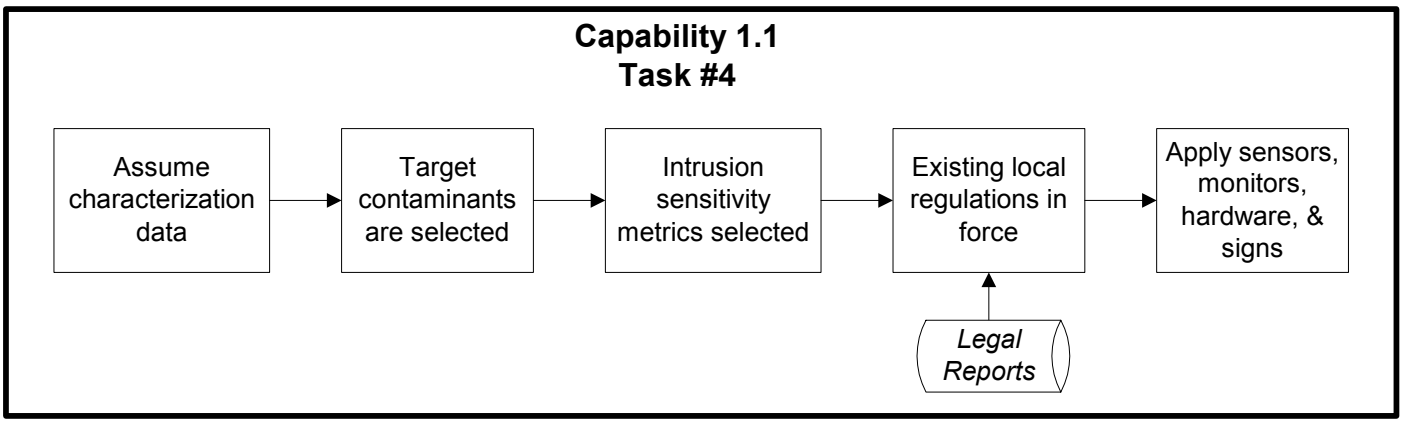


**Expected Products/Results:** A methodology that can be applied to all 2006 closure sites and beyond.

**Task # 4**
**RD&D Phase:** Green **Est. duration** (months): 1.5 **Est. Cost** ($K): $107

**Description:** Establish criteria for passive systems. 1. Ensure that local governmental regulations can be applied to target contaminants to provide necessary occupational exposure protection. Legal criteria for Phase #4 (occupational exposures) will already be established and monitors are already deployed for requisite sensitivity levels for occupational exposure.
2. (Task 4b) determine the sensitivity required for environmental sensors (passive) i.e., topographical changes, intrusion metrics, etc.

**Prerequisites:** Need to have target contaminants and intrusion risks.




**Expected Products/Results:** Application methodology to provide necessary risk based sensors and monitors for the occupational/passive environment that are compliant with steward entity, i.e., city, county, other federal agencies, etc.

**Task # 5**
**RD&D Phase:** Green **Est. duration** (months): 1 **Est. Cost ($K):** $86

**Description:** Benchmark other criteria. In addition to criteria needed for public health exposures and passive systems, criteria are needed for determining intrusion scenarios. These include topographic changes to the surface caused by subsidence or erosion, and physical intrusions related to humans, plants, and animals. Developing criteria for different types of sites will enable stewards to know when action needs to be taken and when it doesn't.

**Prerequisites:** We will need to know the surface conditions for the near-term closure sites and the types of physical barriers planned for keeping intruders out.

**Expected Products/Results:** Once criteria are established, we will be able to work with satellite and remote intruder detection technology people to identify available/future technologies for ascertaining when a stewardship site has been compromised, for example by unanticipated erosion or unanticipated intrusion by humans, plants, or animals.

**Task # 6**
**RD&D Phase:** Green **Est. duration** (months): 3 **Est. Cost** ($K): $252

**Description:** Identify equipment requirements.

Active & Passive. Technology Store addresses criteria, requirements, implementation, maintenance, environment. Fernald has 80% of this done. Use as pilot or test bed. Need certified vendor data. Consider community at risk & targets.

All Passive systems are, for the most part available and ready to install after on-site vendor commissioning. The hardware will be sensitive and precise enough to detect all occupational levels of threats. And, much of the chemical instruments and sensors will be of wireless construction thereby freeing up labor costs for sampling. (YELLOW) Can be deployed with some R&D modifications and re-tooling.

The sensors and monitors, if needed in the CAR, are not available to provide the anticipated sensitivity required for all identified targets of concern. Some vendors have and are developing wireless systems with increased sensitivity and quality that can be employed. The units are being used for detection of specific environmental airborne levels of certain chemicals in industry.

For the active system monitors and sensors, vendor performance criteria will need to be developed for some of the targets of concern and some existing equipment may be required to return to vendor laboratory for re-application and field application engineering analysis prior to being placed into service.

**Prerequisites**: Preliminary to this task, we need the identified targets of concern for the passive threshold limits and for the non-occupational populations within the CAR (active systems).

This Task is YELLOW/Orange

**Expected Products/Results:** Sampling and monitoring detection, precision and assembly/interface criteria for non-occupational targets will take four months after preliminary requirements are completed.

Task will take 4 months @ $200,000.00

**Task # 7**
**RD&D Phase:** Green **Est. duration** (months): 3 **Est. Cost** ($K): $252

**Description:** Develop maintenance requirements for the safety systems. These systems need to be reliable without costly maintenance. Requirements for reliability will define schedules for expected replacement parts and materials. Requirements for onsite presence for maintenance (e.g., to calibrate instrumentation) will define the need for safety systems to perform automated performance checks and remotely notify stewards when equipment and instrumentation failures are imminent. Requirements for ease of repair and replacement will ensure that safety systems can be repaired easily.

**Prerequisites:** None

**Expected Products/Results:** Safety systems that will operate at minimal cost and at minimal failure rates; repair/replacement will be simple and not require highly trained people.

**Task # 8**
**RD&D Phase:** Green **Est. duration** (months): 3 **Est. Cost** ($K): $252

**Description:** Select portfolios of safety systems components. A finite number of options for each subsystem (air contaminant migration detection, water contaminant detection, intrusion detection, barrier integrity assessment, surface integrity assessment, and notification to steward/community at risk)will be selected for inclusion in the stewardship safety system portfolios . The selection will be based on the requirements and what industry thinks it can deliver.

**Prerequisites:** None

**Expected Products/Results:** A draft list of technology options for each stewardship safety system subsystem.

**Task # 9**
**RD&D Phase:** Green **Est. duration** (months): 3 **Est. Cost** ($K): $100

**Description**: Conduct peer review of the stewardship safety system subsystems. Peers will review the draft list of selected technologies for each safety subsystem to determine if the list is efficient, effective, and comprehensive.

**Prerequisites:** None

**Expected Products/Results:** The peer review will result in a confirmed/modified list of options for each safety system subsystem.

**Task # 10**
**RD&D Phase:** Green **Est. duration** (months): 3 **Est. Cost** ($K): $252

**Description**: Assemble store of safety system technologies for near-term closure sites. Each site will be able to assemble its safety systems by selecting the most appropriate technology for each subsystem. An analogy comes from the DOD. If you need a weapon system, you go to the catalog and select the system that best meets your requirements; there is no time or money to develop something new.

**Prerequisites:** Peer review must be done first.

**Expected Products/Results:** A catalog of proven, efficient and reliable technologies from which a site steward can build a stewardship safety system.

**Task # 11**
**RD&D Phase:** Green **Est. duration** (months): 3 **Est. Cost** ($K): $215

**Description:** Distribute catalog of technology options to closure sites.

**Prerequisites:** All the previous steps plus the technologies need to be manufactured.

**Expected Products/Results:** Sites will select and implement the technologies for their safety systems.

# SS&IC

# 2.0 Develop & Maintain Integrity of Access Control and Safety Systems

**Capability:** **2.3 System performance module for collecting and analyzing, evaluating and disseminating data (templates).**

**Target:** **Issue action criteria for collecting, analyzing and evaluating representative data for security and exposure systems functionality to reduce cost by 60%.**

**April 8, 2002**

**Prepared by: Safety Systems & Industrial Controls Working Group:**

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Long-Term Stewardship
Science and Technology Roadmap

# TECHNICAL APPROACHES (FORM A)

**Program Activity:** 2.0 Develop & Maintain Integrity of Access Control and System.

**Capability:** 2.3 System performance module for collecting and analyzing, evaluating and disseminating data (templates).

**Associated Target(s):** Issue action criteria for collecting, analyzing and evaluating representative data for security and exposure systems functionality to reduce cost by 60%.

**Technique/technology # 2.3.1**

**Title:** Technology to remotely detect physical changes at a closed site and to identify changes that could result in an adverse impact on the environment (change detection).

**Current maturity level:** There are no known situations where closed sites are being passively evaluated for adverse intrusion by people, flora, and fauna or for naturally occurring changes at the site. Such evaluation technologies do exist but must be modified and demonstrated for the defined application.

**Range of applicability:** The technology should be applicable to all sites that require ongoing monitoring after closure.

**Needed RD&D:** Demonstrate the capability of fuzzy logic to sense changes in site monitoring characteristics, to initiate alarms and to generate summary reports of adverse trends.

**Technique/technology #2.3.2**

**Title:** Technology to decide appropriate action needed (decision analysis) if the parameters of a closed site change to a potentially adverse condition.

**Range of applicability:** The technology should be applicable to all sites that require ongoing monitoring after closure.

**Current maturity level: (Green/Yellow)** There are no known situations where closed sites are being passively evaluated for adverse intrusion by people, flora, and fauna or for naturally occurring changes at the site. Such evaluation technologies do exist but must be modified and demonstrated for the defined application.

**Needed RD&D:** Develop software to monitor the various safety monitoring and intrusion detection devices, to analyze and differentiate among benign, chronic, and acute situations at a site, and to remotely communicate the site's status to appropriate authorities.

Appendix A summarizes the benefits of pursuing these technology development programs.

# TECHNOLOGY PATHWAY SUMMARY (FORM B)

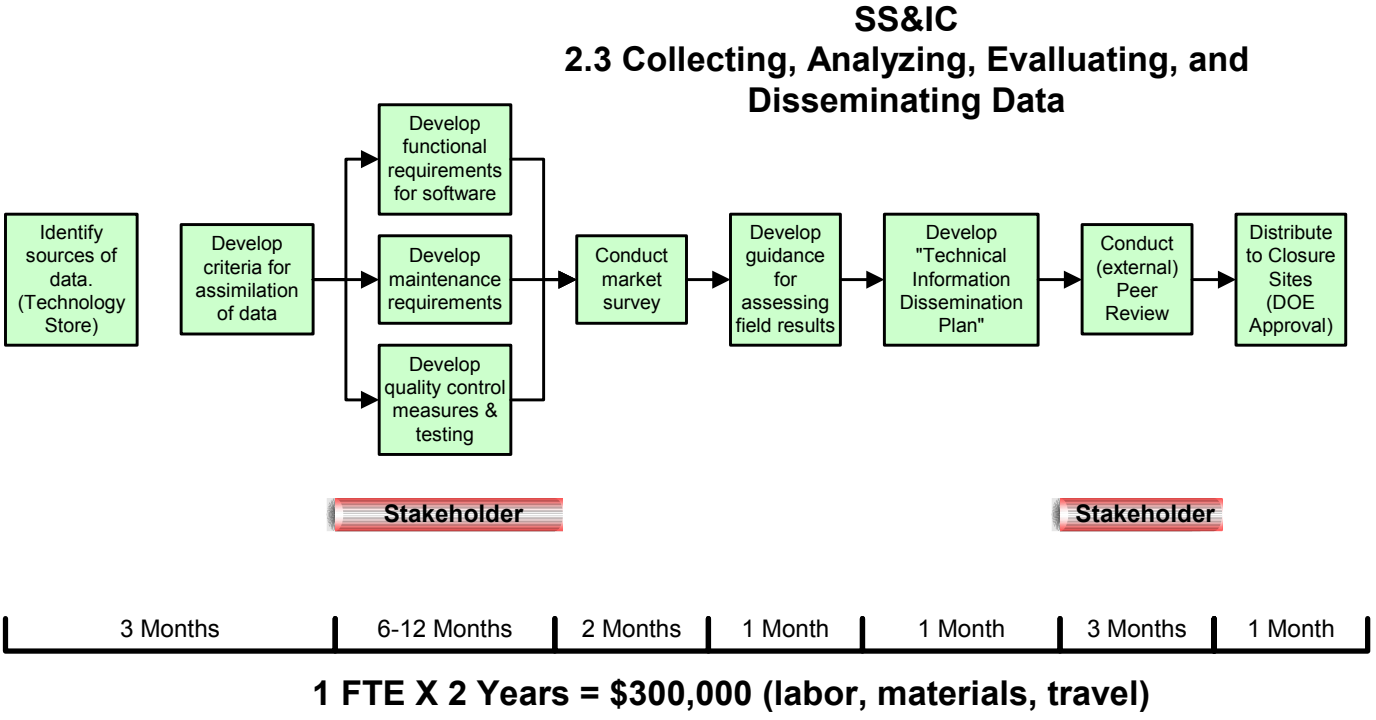
**Program Activity:** 2.0 Develop & Maintain Integrity of Access Control and System.

**Capability:** 2.3 System performance module for collecting and analyzing, evaluating and disseminating data (templates).

**Associated Target(s):** Issue action criteria for collecting, analyzing and evaluating representative data for security and exposure systems functionality to reduce cost by 60%.

**Sketch of task relationships:**

The following sketch shows the relationships among the various tasks for this target. The final product is an automated, self-validating, data sampling and analysis system.




**1 FTE X 2 Years = $300,000 (labor, materials, travel)**

## Task # 1

**RD&D Phase:** Definition **Est. duration** (months): 3 **Est. Cost** ($K): $38

**Description:**
This task includes two subtasks:
Task 1A: Identify sources of data that will be collected and analyzed using the "technology store" described in capability 1.1. This would include data generated by active and passive monitoring systems. A closed site (or a site designated for near term closure) will be selected to develop templates that can then be applied to aid in the planning for security and exposure systems data collection, analysis and evaluation at other sites.
Task 1B: Develop the criteria for assimilating the data.

It is estimated that one person could complete these subtasks for a designated site in a period of three months. The subtasks involve determining the applicability of various data elements relative to passive monitoring of a site's physical condition. The data elements are generated by deployed technologies that were selected and installed prior to the site's closure. Since the data elements are known, the level of effort required during these initial subtasks is small. Assuming an annual cost of $100,000 per person and adding $50,000 per year for materials, equipment and travel then the cost for a 3-month effort is $37,500.

**Prerequisites:**
The program must be funded and assigned to a sponsor. The technology store (capability 1.1) must be established. A site must be selected to demonstrate the applicability of the planned approach.

**Expected Products/Results:**
A matrix of data attributes that will be collected and analyzed for the demonstration site should be prepared. The matrix should identify a graded approach (e.g. chronic versus acute) for evaluating and acting on the information represented by the data. It should serve as a template for other sites to use during planning for long term stewardship.

## Task # 2

**RD&D Phase:** Establish Requirements **Est. duration** (months): 6-12 **Est. Cost** ($K): $150

**Description:**
This task consists of three subtasks. These subtasks can be performed in parallel. It is expected that there will be interaction among all three subtasks so iterations of a subtask may be required to establish the software requirements. Each of these subtasks will be developed for a designated site and will be written so that they can be used as a template for other sites.
Task 2A involves developing the functional requirements for the software.
Task 2B involves developing the software maintenance requirements.
Task 2C involves developing the quality control measures and testing protocols for the software.

These tasks represent the first opportunity for meaningful involvement of the stakeholders. It is expected that the established software requirements will include input from the stakeholders so that future changes to the final product can be minimized.

It is estimated that one full time equivalent can perform these subtasks in 6 to 12 months. This equates to $75,000 to $150,000. The uncertainty is due to the unknown amount of revision required as a result of the stakeholder involvement.

**Prerequisites:**
Prior to initiating these subtasks, the project must have a clear definition of the expected deliverables.

**Expected Products/Results:**
These subtasks are expected to establish measurable requirements for the software development effort. These requirements will establish the framework under which the software will be evaluated for acceptability. The requirements will be documented and traceable. Concurrence by the affected stakeholders will be obtained and differing professional opinions will be identified and resolved.

**Task # 3**

**RD&D Phase:** Evaluate current technologies **Est. duration** (months): 2 **Est. Cost** ($K): $25

**Description:**
This task consists of performing a market survey to determine the availability of commercial software products that may used or may be modified for use. The products offered by various firms will be evaluated for applicability.

It is expected that one person can complete this task in two months. This equates to $25,000.

**Prerequisites:**
The needs and requirements of the software must be clearly defined and documented.

**Expected Products/Results:**
A report will be prepared to summarize the availability of applicable software, the cost of the software, the cost of modifying software for specialized application, and restrictions relative to using the software. If commercial software is not available, then the effort required to generate the software should be estimated.

**Task # 4**

**RD&D Phase:** Develop Performance Measures **Est. duration** (months): 1 **Est. Cost** ($K): $13

**Description:**
This task involves developing the guidance for assessing the field results. Depending on the information contained in the data, various actions may be required. These might include no-action other than data recording, response to the site to mitigate a circumstance, or notification of adverse trends. It is estimated that one person can develop the guidance for the demonstration site in one month. This equates to $12,500.

**Prerequisites:**
The data collection systems and the information represented by the data elements must be understood so that they can be translated into appropriate actions.

**Expected Products/Results:**
The guidance should establish a menu of actions required based on the potential adverse consequences as predicted by analyzing the data. This task will be developed for a designated site and will be written so it can be used as a template for other sites.

**Task # 5**

**RD&D Phase:** Pre-publication **Est. duration** (months): 1 **Est. Cost** ($K): $13

**Description:**
This task involves developing the technical information dissemination plan. The form of and amount of data to be disseminated needs to be tailored to the audience and to the final use of the data. The plan should specify the data format (e.g. threshold, trends, chart, tabular, etc.) and should provide for effective presentation of the data. Extraneous or meaningless data should be culled from the data presentation.

It is estimated that one person can develop the data dissemination plan for the demonstration site in one month. This equates to $12,500.

**Prerequisites:**
The needs of the audience, the data collection systems and the information represented by the data elements must be understood so that an effective data dissemination plan can be developed.

**Expected Products/Results:**
A plan for effective dissemination of collected data to the various audiences including the local community, the regulators, and the entity responsible for the site's contents. The plan should provide for efficient dissemination, while minimizing extraneous information.

**Task # 6**

**RD&D Phase:** Peer review **Est. duration** (months): 3 **Est. Cost** ($K): $38

**Description:**
This task consists of the external peer reviews of the plans associated with demonstrating the data collection, analysis, evaluation, and dissemination at a designated site. It is expected that the various stakeholders will participate in the peer review effort.

One full time equivalent for three months is estimated for this task. This equates to $37,500.

**Prerequisites:**
Clear, concise documentation of the planned demonstration program must be prepared and printed. The peer group and the stakeholders must be identified.

**Expected Products/Results:**
Written and verbal presentations will be made to various groups including the local community, the scientific community, the regulators, and the entity responsible for the funding the project. Comments received will be evaluated and resolved. The documentation will be revised as appropriate.

**Task # 7**

**RD&D Phase:** Closeout **Est. duration** (months): 1 **Est. Cost** ($K): $13

**Description:**
This task consists of distributing the guidance document to the applicable sites that will be involved in long term stewardship.

**Prerequisites:**
All plans and documentation must be revised into final form.

**Expected Products/Results:**
A template that can be used to plan for and design a long term data management system including collecting and analyzing the data as well as evaluating and disseminating the data elements.

## Appendix A – Benefits of Proceeding with the Technology Development

The impact of the capability for collecting and analyzing, evaluating and disseminating data was evaluated as "high" in the areas of cost, technical uncertainty, and risk. The work team believes that substantial cost savings (60% or more) can be achieved when compared to current labor intensive systems for collecting, analyzing, and managing the data collected at a closed site. Additionally the following are expected benefits as a result of funding this effort:

- Avoid last minute stakeholders, regulators, intervention, and fees
- Avoid using outdated equipment and technologies
- Eliminates labor intensive activities
- Eliminates "work a rounds"
- Eliminates human error
- Automated, remote
- Capitalize on commercial successes
- Comprehensive profile of site conditions (defense in depth)
- Reduces single point failures
- Reduces unnecessary, repetitive, duplicative monitoring
- Can extrapolate and optimize maintenance activities and costs

# SS&IC

# 3.0 Optimize Operational and Technical Management and Administration

**Capability:** **3.1 Validate overall (technical/non-technical) system performance**

**Target:** **Issue a model for reassessment of overall safety system effectiveness.**

**April 8, 2002**

**Prepared by: Safety Systems & Industrial Controls Working Group:**

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# TECHNICAL APPROACHES (FORM A)

**Program Activity:** 3. Optimize operational and technical management and administration

**Capability:** 3.1 Validate overall (technical/non-technical) system performance.

**Associated Target(s):** Issue a model for reassessment of overall safety system effectiveness.

**Technique/technology #3.1.1.**

**Title:** Decision analysis

**Range of applicability:** The technology should be applicable to all closure sites, for contaminants in the groundwater, soils, and air.

**Current maturity level:** Green/yellow. There are existing systems/packages not directly appropriate to LTS, but could be adapted.

**Needed RD&D:** Develop a system that integrates all components of SS&IC and determines/recommends appropriate action or mitigation necessary to assure continued, overall safety system performance.

**Technique/technology #3.1.2.**

**Title:** Knowledge Management

**Range of applicability:** The technology should be applicable to all closure sites, for contaminants in the groundwater, soils, and air.

**Current maturity level:** Green/yellow. There are existing systems/packages not directly appropriate to LTS, but could be adapted.

**Needed RD&D:** Software/communications package/plan, which disseminates relevant information to stakeholders and stewards informing them on status of system, how it is performing, and on any actions that may need to be resolved.

# TECHNICAL APPROACHES (FORM B)

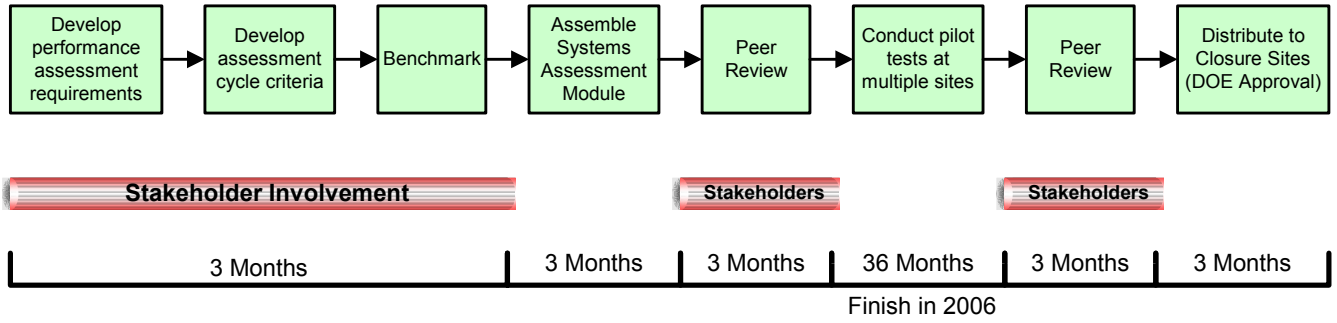
**Program Activity:** 3. Optimize operational and technical management and administration

**Capability:** 3.1 Validate overall (technical/non-technical) system performance.

**Associated Target(s):** Issue a model for reassessment of overall safety system effectiveness.

**Sketch of task relationships:**

**SS&IC**
**3.1 Reassessment Module (Applies to Technology Store)**




**$2 Million (2 FTEs for one site pilot, materials, travel)**

**Task # 1**
**RD&D Phase:** **Est. Duration** (months): 6 **Est. Cost** ($K): $33

**Description:** Develop feedback system (software package) that integrates all SS&IC parameters being monitored for optimal effectiveness.

**Prerequisites:** Identify all safety systems and institutional controls that will be in place post-closure.

**Expected products/results:** Site specific, integrated data management system for SS&IC.

**Task # 2**
**RD&D Phase:** **Est. Duration** (months): 6 **Est. Cost** ($K): $33

**Description:** Develop performance assessment requirements. Determine action/regulatory levels for specific monitoring parameters.

**Prerequisites:** Monitoring parameters.

**Expected products/results:** Design criteria. Manual. Data Dictionary.

**Task # 3**
**RD&D Phase:** **Est. Duration** (months): 3 **Est. Cost** ($K): $100

**Description:** Peer review of reassessment system involving impacted and appropriate stakeholders and experts to establish that model/software incorporates all applicable criteria and is user friendly.

**Prerequisites:** Identify affected stakeholders, experts in the field, and competent reviewers.

**Expected products/results:** Validated re-assessment model with/for stakeholders.

**Task # 4**
**RD&D Phase:** **Est. Duration** (months): 36 **Est. Cost** ($K): $300

**Description:** Pilot test the reassessment model at closure sites to make sure the system/software is adequate and incorporates changes as appropriate.

**Prerequisites:** Identify closure sites.

**Expected products/results:** Fully operational and implemented reassessment model that can be used as a template for other closure sites.

**Task # 5**
**RD&D Phase:** **Est. Duration** (months): 3 **Est. Cost** ($K): $150

**Description:** Peer review the pilot tested model for applicability and incorporation of relevant features for transfer of model/package to other closure sites.

**Prerequisites:** Identify other closure sites and appropriate peer reviewers.

**Expected products/results:** A complex-wide reassessment model/package/software for SS&IC.

### 3.1 Notes from Orlando Meeting

Develop feedback system eg  cost benefit (criteria for assessment)
Assess performance
Incorporate regulatory changes
Incorporate technical changes
Determine changes to community at risk
Incorporate changes in site conditions
Determine assessment cycle for safety systems, maintenance (nested do loop)
Regulatory changes may force changes
Different for regulatory, maintenance, technology

# SS&IC

# 3.0 Optimize Operational and Technical Management and Administration

**Capability:** **3.4 Deploy optimal technology options for ensuring the preservation of site information from intergenerational technical continuity and reduce uncertainty.**

**Target:** **Deploy intergenerational archive.**

**April 8, 2002**

**Prepared by: Safety Systems & Industrial Controls Working Group:**

**Jim Mohatt, Chairman**
**Lori Braase, Facilitator**
**Norm Brandon**
**David French**
**David Johnson**
**Donald Paine/ Marty Prochaska**
**⇨Kimberly Peone**
**Darby Stapp**

Long-Term Stewardship
Science and Technology Roadmap

# Technical Approaches (Form A)

**Program Activity:** 3.0 Optimize operational and technical management and administration.

**Capability:** 3.4 Deploy optimal technology options for ensuring the preservation of site information from intergenerational technical continuity and reduce uncertainty.

**Associated Target(s):** Deploy intergenerational archive.

**Technique/technology #1**

**Title:** Paper, video, micro fiche, digital, photos.

**Current maturity level:** Green.

**Range of applicability:** The technology should be applicable to all sites that require ongoing monitoring after closure.

**Needed RD&D:** Green. The processes and methods are available to the target capability. There is not universal method with regards to retaining records for stewardship that requires additional efforts beyond those typically used for DOE records. There is relatively inconsistent method of retaining information in a universal matter. The variation will make it challenging for future managers, operators, and scientists.

**Technique/technology #2**

**Title:** Symbols/markers.

**Current maturity level:** Yellow.

**Range of applicability:** The technology should be applicable to all sites that require ongoing monitoring after closure.

**Needed RD&D:** Yellow.

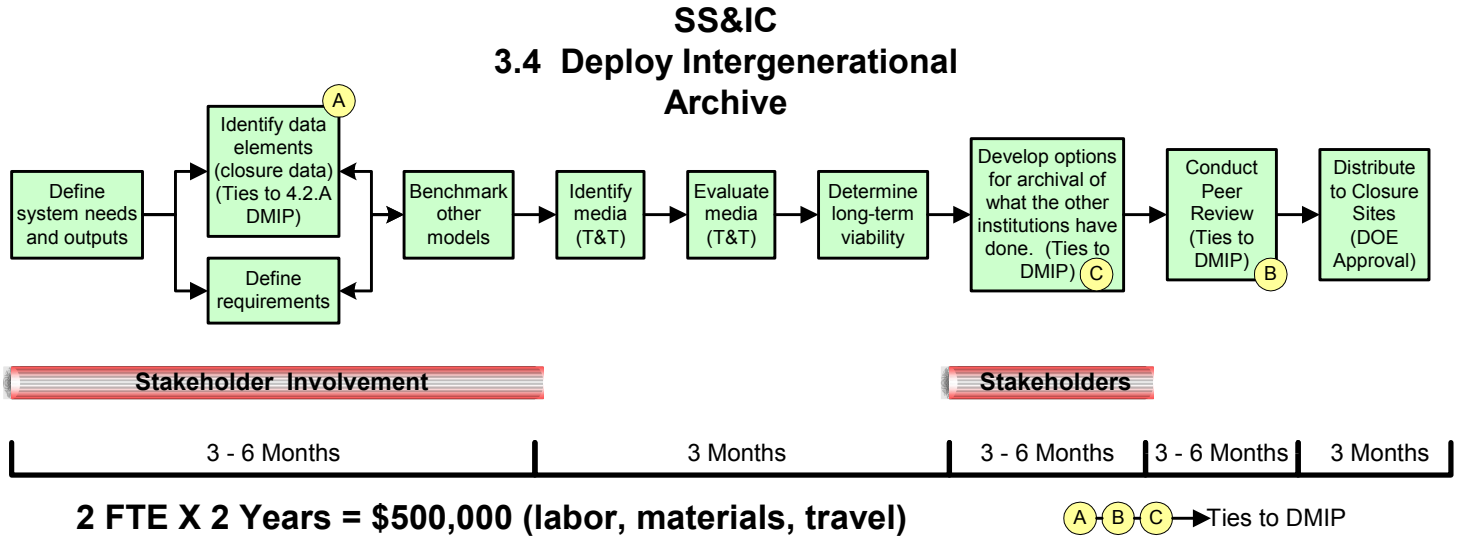
# Technology Pathway Summary (Form B)

**Program Activity:** 3.0 Optimize operational and technical management and administration.

**Capability:** 3.4 Deploy optimal technology options for ensuring the preservation of site information from intergenerational technical continuity and reduce uncertainty.

**Associated Target(s):** Deploy intergenerational archive.

**Sketch of task relationships:**




**Task # 1**

**RD&D Phase:** Green **Est. duration** (months): 6 **Est. Cost** ($K): $31

**Description**: Define systems needs & outputs (obtain consensus).

What needs? Location? Access requirements. Who needs it?

**Prerequisites:**

**Expected Products/Results:**

**Task # 2**
**RD&D Phase:** Green **Est. duration** (months): 6 **Est. Cost** ($K): $31

**Description:**
Identify Data Elements:

- Operational records
- Liability issues
- Closure data

**Prerequisites:**

**Expected Products/Results:** Understanding the efficiency and/or inefficiency to respond accordingly to meeting the needs of the stewards long-term.

**Related Capability:** Deploy optimal technology options for ensuring the preservation of site information from intergenerational technical continuity and reduce uncertainty.

**Task # 3**
**RD&D Phase:** Green **Est. duration** (months): 6 **Est. Cost** ($K): $31

**Description:** Define requirements.

**Prerequisites:**

**Expected Products/Results:** The requirements will drive the outcome for long-term stewardship. If it is deemed critical to chose one methods over another, or one media over another, which will drive the success and/or failure.

**Task # 4**
**RD&D Phase:** Green **Est. duration** (months): 6 **Est. Cost** ($K): $32

**Description:** Benchmark other models.

**Prerequisites:**

**Expected Products/Results:** There has to be a process of thought towards records management. What will the site used for facilities, media, processes, methods, and required guides. From the information research to find the best fit for that site using the guidelines set forth.

**Task # 5**
RD&D Phase: Green **Est. duration** (months): 3 **Est. Cost** ($K): $21

**Description:** Identify media. List of techniques/technologies.

**Prerequisites:**

**Expected Products/Results:** The best media to date is paper and books. Acid-paper is recommended for protection against break down of paper, and no fading. We must also consider labeling of field books, drawings, and other records, and documenting how records are created – particularly electronic records.

**Task # 6**
**RD&D Phase:** Green **Est. duration** (months): 3 **Est. Cost** ($K): $21

**Description:** Evaluate media.

**Prerequisites:**

**Expected Products/Results:** We must be able to evaluate the effectiveness and ineffectiveness in the media used to preserve information. Responding to the inefficiency is critical.

**Task # 7**
**RD&D Phase**: Green **Est. duration** (months): 3 **Est. Cost** ($K): $21

**Description:** Determine long-term viability.

**Prerequisites:**

**Expected Products/Results:**

**Task # 8**
**RD&D Phase:** Green **Est. duration** (months): 6 **Est. Cost** ($K): $125

**Description**: Develop options for archival.

**Prerequisites:**

**Expected Products/Results:**

**Task # 9**
**RD&D Phase:** Green **Est. duration** (months): 6 **Est. Cost** ($K): $125

**Description:** Conduct peer review.

**Prerequisites:**

**Expected Products/Results:** A peer review will help with the ownership and participation on preserving the managing of any records for the steward.

**Task # 10**
**RD&D Phase:** Green **Est. duration** (months): 3 **Est. Cost** ($K): $62

**Description:** Distribute to closure sites.

**Prerequisites:**

**Expected Products/Results:** Document how records were created and file accordingly.

# SS&IC

# 4.0 Define Legal Strategy

**Capability:** **4.0 Identify potential legal strategies, develop alternative legal draft instruments, assess established agreements, and develop pathway modules.**

**Target:** **Provide options for potential legal strategies and associated instruments to facilitate handoff of closed sites to final steward.**

**April 8, 2002**

**Prepared by: Safety Systems & Industrial Controls Working Group:**

**Jim Mohatt, Chairman**
**Lori Braase, Facilitator**
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Long-Term Stewardship
Science and Technology Roadmap

# TECHNICAL APPROACHES (FORM A)

**Program Activity:** 4.0 Define legal strategy.

**Capability:** 4.0 Identify potential legal strategies, develop alternative legal draft instruments, assess established agreements, and develop pathway modules.

**Associated Target(s):** Provide options for potential legal strategies and associated instruments to facilitate handoff of closed sites to final steward.

~~**Target** - Completed Systems Pathway Module by **2004**, full DOE use by **2006** and template for federal agencies by **2008**. Used by closure sites, organizations, e.g., ECOS, stakeholders and site stewards or trustees~~. ( I believe the above target has the correct language from the Orlando Meeting - Lori)

**Form A and flowchart was created prior to Orlando. The team in Orlando created Form B and that flowchart.**

**Technique/technology #1**

**Title:** Development of a System Pathway Module. Module will have overall categories. State restrictions of exceptions will be noted, but this will be a general strategy.

**Current maturity level:**

**Range of applicability:**

**Needed RD&D:** Development of a System Pathway Module with specific examples of legal instruments and model documents that are legally and practically; such as, deeds of trust, reverters, restrictions, easements, negative easements, covenants or other servitudes that realize effective institutional control over a site in LTS.

For this target, what is the final result of the RD&D? Improved and consistent set of legal pathways and instruments that can be employed or act a model for LTS institutional controls at a closure site. (Accepted by appropriate federal, state and local authorities) Accepted by deed holders and/or community recipients and their principle regulatory bodies. Agreed to by the states, involved federal agencies, National Governors Association and stakeholders.

For the first approach, what are the main RD&D tasks?

1. Risk assessment conducted on 6 example communities at risk (handled in other targets)
2. Evaluate what we (any existing legal controls) have now (what is presently being used for land-use control), including cross-walking against what will be needed in the future.

2a. Develop lessons learned document based on historical experiences, indicating why current situation is non-optimal

3. Draft Systems Pathway Module, including development of any new legal instruments and any modification of existing instruments, peer review, incorporate comments, and finalize
4. Obtain approvals of manual from cognizant subject matter experts.

Indicate which tasks are primarily Research, primarily Development, or primarily Demonstration/Deployment

1. Research
2. Research
2a. Research
3. Development
4. Deployment

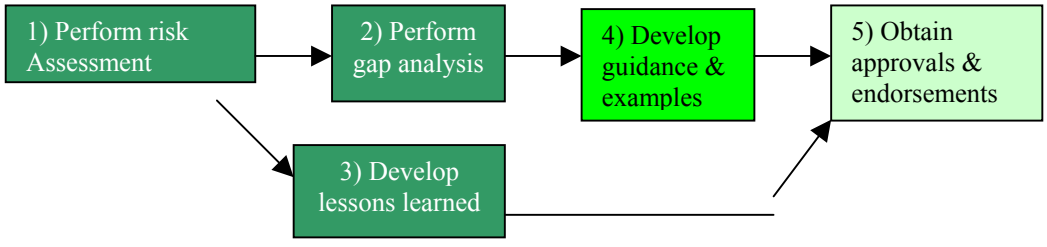
Identify and match up prerequisites and products for each task

1. Prereqs – none
   Products – Identification of legal instruments needed in future
2. Prereqs - Identification of legal instruments
   Products – Crosswalk of existing versus needed new or proposed legal instruments (gap analysis)
2a. Prereqs – Risk assessment
   Products – historical arguments (past failures)
3. Prereqs - Crosswalk of existing versus needed legal instruments (gap analysis)
   Products – Final guidance document
4. Prereqs – Guidance document, historical arguments
   Products – Improved and consistent set of legal instruments approved by appropriate higher authorities

Estimate the duration and (time permitting) the cost of each task

3 months @ 2 FTEs
6 months @ 2 FTEs
2a. 3 months @ 1 FTE
6 months @ 2 FTEs
6 months @ 1 FTE

Sketch of task relationships




[ Year 1 ] [ Year 2 ] [ Year 3 ] [Years 4 & 5]

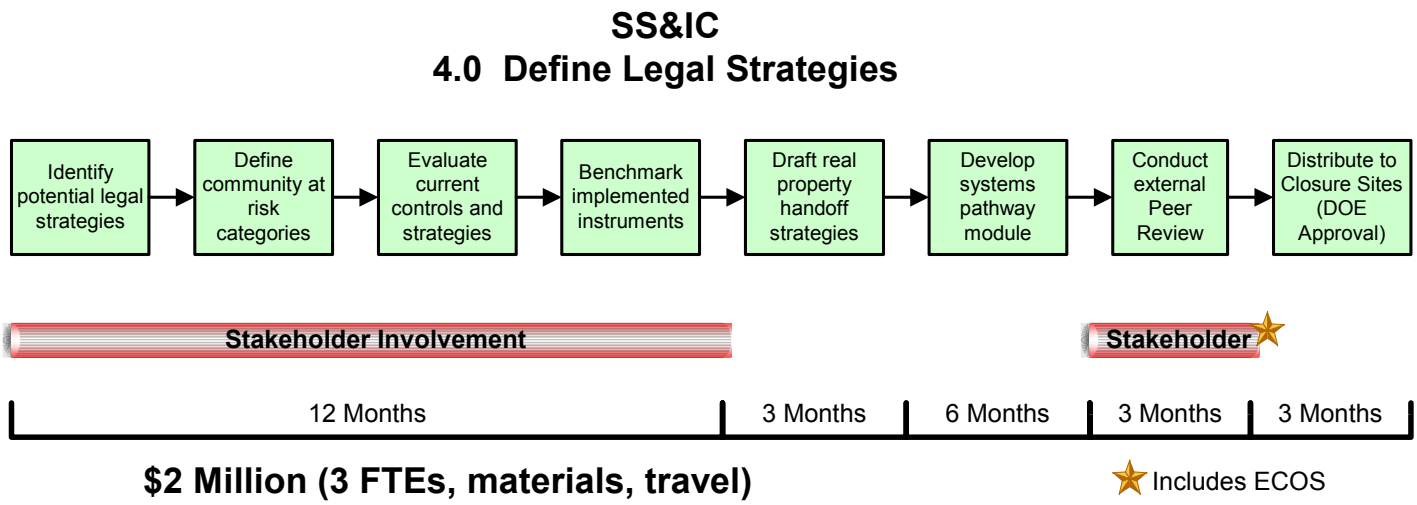
# Technology Pathway Summary (Form B)

**Program Activity:** 4.0 Define legal strategy.

**Capability:** 4.0 Identify potential legal strategies, develop alternative legal draft instruments, assess established agreements, and develop pathway modules.

**Associated Target(s):** Provide options for potential legal strategies and associated instruments to facilitate handoff of closed sites to final steward.

**Sketch of task relationships:**




**Task # 1**
**RD&D Phase**: Research **Est. duration** (months): 3 @ 2 FTEs **Est. Cost** ($K): $150

**Description:** A risk assessment will be conducted on 6 example communities at risk. The assessment will determine the breath and scope of institutional controls that have been incorporated at closed federal facilities. The sites will have to define "community at risk" in the template.

**Prerequisites:** None

**Expected Products/Results:** Identification of institutional controls that are currently being implemented at various federal facilities and their effectiveness in achieving the requisite end state(s).

**Task # 2**
**RD&D Phase:** Research **Est. duration (months):** 6 @ 2 FTEs **Est. Cost** ($K): $250

**Description**: An evaluation of existing land use institutional controls will be conducted. The evaluation will include identification of current control methods, development of a crosswalk of existing controls versus controls needed in the future, and identification of gaps needing either new legal instruments or modification of existing legal instruments.

**Prerequisites:** Identification of legal instruments needed in the future.

**Expected Products/Results:** Crosswalk of existing versus needed new or proposed legal instruments (gap analysis).

**Task # 3**
**RD&D Phase**: Research **Est. duration** (months): 3 @ 1 FTE **Est. Cost** ($K): $150

**Description:** A study of historical experiences with land use control will be conducted to develop lessons learned on what has worked and what hasn't (and why). Results will be summarized in "historical arguments" indicating where and why current legal instruments are non-optimal

**Prerequisites:** Identification of legal instruments needed in the future.

**Expected Products/Results:** Historical arguments (past failures and successes).

**Task # 4**
**RD&D Phase:** Development **Est. duration** (months): 9 @ 2 FTEs
**Est. Cost** ($K): $187.5

**Description:** A land use institutional controls guidance document will be developed that indicates legal alternatives and the discriminating factors to be used in their selection. This task will include drafting of the document, inclusion of examples, peer review, incorporation of comments, and finalization of the document

**Prerequisites:** Crosswalk of existing versus needed legal instruments (gap analysis).

**Expected Products/Results: Final Systems Pathway Module for institutional control guidance document with examples and model documents.**

**Task # 5**
**RD&D Phase:** Deployment **Est. duration** (months): 24 **Est. Cost** ($K):

**Description:** Appropriate approvals and endorsements will be obtained for the land use control legal instruments guidance document. This includes approval by DOE and approval or endorsement by appropriate representation of local authorities expected to be involved with future LTS-related land use control issues (e.g. endorsement by the association of state governors).

**Prerequisites:** Final legal guidance document, Historical arguments

**Expected Products/Results:** Systems Pathway Module Institutional Controls guidance document with examples approved and endorsed by DOE, the National Governors Association, and Environmental Council of the States (ECOS – a national non-profit, non-partisan association of state and territorial environmental commissioners).